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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)

Allocation of Spectrum Below)
5 GHz Transferred from)
Federal Government Use)

ET Docket No. 94-32

TO: The Commission

REPLY COMMENTS OF
INTERNATIONAL BUSINESS MACHINES CORPORATION

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January 6, 1995

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SUMMARY

As the comments in this proceeding make overwhelmingly clear, any reallocation of the 2402-2417 MHz band to licensed use would cause substantial harm to the public interest without resulting in any viable uses of the spectrum. The comments advocate the policy originally supported by the Commission's August 1994 report to NTIA and more recently advocated by NTIA: The band should be allocated to its incumbent Part 15 and other uses.

Reallocation of the band would seriously jeopardize the continued viability of the band's existing Part 15 devices, which Commission policy has helped to encourage. Disruption of this band would have significant economic costs to manufacturers, users, and the U.S. economy as a whole. It would have no concurrent benefits, because the comments contain no workable proposal for a licensed use that is compatible with the characteristics of the 2402-2417 MHz band. To preserve the continued use of this band for wireless LANs and other new technologies that are already forming an important part of the National Information Infrastructure, and to maintain the regulatory stability that is critical to continued investment in such developing technologies, the band should be reserved for its incumbent Part 15 and other uses.

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REPLY COMMENTS OF
INTERNATIONAL BUSINESS MACHINES CORPORATION

International Business Machines Corporation ("IBM") respectfully submits its Reply Comments in the above-referenced proceeding.^{1/} Like IBM's initial Comments, these Reply Comments focus exclusively on the proposed allocation of the 2402-2417 MHz band. As we show below, the significant majority of comments in this proceeding demonstrate that the Commission should remain consistent with its original recommendation concerning the 2402-2417 MHz band, and allocate it to its incumbent Part 15 and other uses.

I. **THE COMMENTS CONFIRM OVERWHELMINGLY THAT
REALLOCATION OF THE 2402-2417 MHZ BAND TO LICENSED USE
WOULD SUBSTANTIALLY HARM THE PUBLIC INTEREST.**

The Commission is required to allocate the 50 MHz of spectrum transferred by the National Telecommunications and

^{1/} Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, ET Docket No. 94-32, FCC 94-272 (rel. Nov. 8, 1994) ("NPRM").

Information Administration ("NTIA") in the manner that will best "promote public convenience or interest or will serve public necessity."^{2/} As NTIA recognized in its initial spectrum report, "[r]eallocation that disrupts . . . existing consumer and commercial services, or results in the loss of investment by manufacturers, can create an environment in direct conflict with the public interest."^{3/} The comments submitted in this proceeding demonstrate that the detrimental effects of reallocating the band to licensed uses would cause irreparable harm to the Part 15 industry and to society at large. These comments overwhelmingly support the Commission's own original conclusions^{4/} -- and NTIA's more recent recommendation^{5/} -- suggesting that the 2402-2417 MHz band is best reserved for its incumbent uses.

A. The Comments Demonstrate The Major Societal Benefits That Have Resulted From The Commission's Encouragement Of Investment In Part 15 Technology.

The record of this proceeding now makes clear without any doubt the extent to which companies of all sizes, including a number of start-up firms, have responded to the Commission's

^{2/} 47 C.F.R. § 303 (f); see also § 303 (c).

^{3/} Preliminary Spectrum Reallocation Report, NTIA, ¶¶ 3-15 (Feb. 1994).

^{4/} Report to Ronald H. Brown, Secretary, U.S. Department of Commerce, Regarding the Preliminary Spectrum Reallocation Report ("FCC Report"), FCC 94-213, ¶ 51 (Rel. Aug. 9, 1994).

^{5/} Letter from NTIA Assistant Secretary for Communications and Information Larry Irving to Chairman Hundt ("NTIA Letter") (December 12, 1994).

explicit encouragement to invest in Part 15 technology using the 2402-2417 MHz band. As Advanced Micro Devices ("AMD") asserts:

Dozens of American manufacturers, most of which are small, highly innovative companies, have invested heavily in developing spread spectrum technology at 2.4 GHz in reliance on the FCC's 1990 [Spread Spectrum Order] . . . [I]mpeding the utility of 2.4 GHz for Part 15 devices would obsolete billions of dollars in research and development, engineering and production plant, and inventory.^{6/}

Norand notes, as IBM explained earlier,^{7/} that "[u]sage of Part 15 devices continues to grow at an astounding rate," and the "market for equipment used to support wireless LANs is already \$500 million and expected to grow as fast as the wireless LAN market itself, making it a potentially multi-billion dollar market."^{8/} The Part 15 Coalition confirms that "the explosion of consumer and business products using this technology has far exceeded all expectations" and notes that its members have invested over \$2 billion in research and development of unlicensed radio devices.^{9/}

The significant societal benefits of this explosion of Part 15 technology are also undisputed. Like the Commission's

^{6/} Comments of AMD at 4-5.

^{7/} Comments of IBM at 6-7.

^{8/} Comments of Norand at 5, 6.

^{9/} Comments of Part 15 Coalition at 2, 6. See also Comments of Symbol at 4; Comments of 3Com at 3; Comments of Digital Ocean at 2; Comments of Andrew at 6.

own Report to NTIA,^{10/} the comments demonstrate that "[c]ommercial applications of Part 15 [technology] have . . . become part and parcel of daily business life. Indeed, many businesses literally could not function without the information and support provided by Part 15 equipment."^{11/} Rockwell anticipates that Part 15 technology applications "might eventually produce widespread portable networking and completely flexible information systems solutions to support the 'virtual office' of the future,"^{12/} while Symbol cites the revolutionary effects that Part 15 devices have had in retail and manufacturing.^{13/} Larus points out that Part 15 technology has also "benefited the public through the provision of quick turn up temporary service links [for] . . . disaster recovery, cellular service by means of temporary links, [and] computer to computer links."^{14/}

^{10/} The benefit[] of providing short-range communications via unlicensed low power devices is generally recognized, and interest in such devices is growing. Recently there have been dramatic developments in such equipment such that it now can provide a wide and versatile array of services including cordless phone, wireless local area networks, wireless PBX, point-to-point communications, inventory tracking systems, and IVHS-related systems. FCC Report, ¶ 50.

^{11/} Comments of the Consumer Electronics Group of the Electronics Industries Association ("CEG/EIA") at 3.

^{12/} Comments of Rockwell at 3.

^{13/} Comments of Symbol at 2-3.

^{14/} Comments of Larus at 1; see also Comments of Cylink at 4.

Moreover, as NTIA emphasized in its recent letter to the Commission, Part 15 devices are of "critical importance . . . to the development of the National Information Infrastructure."^{15/} In particular, the Part 15 Coalition confirms IBM's earlier comments^{16/} that "[s]chools, hospitals . . . and the general public have greatly benefited from low-cost deployment of communications and monitoring services."^{17/} AMD similarly predicts that Part 15 devices "will . . . expand the availability of networked computing in the nation's public schools by reducing the need for expensive and disruptive wiring, and will support remote medical monitoring within hospitals and private homes."^{18/} With development of the next generation of lower-cost Part 15 technology, these devices will become even more prevalent in schools, libraries, and hospitals.

B. Reallocating The 2402-2417 MHz Band Would Essentially Destroy The Development Of And Investment In Part 15 Technology.

The record in this proceeding also confirms the views of the Commission and NTIA that any reallocation of the 2402-2417 MHz band to licensed uses would seriously jeopardize Part 15 technology. As the comments make clear, "[t]he introduction of

^{15/} NTIA Letter.

^{16/} Comments of IBM at 8-9.

^{17/} Comments of Part 15 Coalition at 2.

^{18/} Comments of AMD at 3-4; see also Comments of 3Com at 2; Comments of Symbol at 3; Comments of WINForum at 3; Comments of Xircom at 3.

licensed services into this band would dramatically limit the amount of available spectrum in which these [Part 15] technologies could seek clear channels."^{19/} Part 15 devices require unhampered use of the 2402-2417 MHz portion of the 2400 MHz band to operate effectively: this segment is the band's "sweet spot," experiencing the least amount of microwave interference and thus facilitating the throughput and speed of Part 15 devices.^{20/} Interfering with Part 15 use of this portion of the band would therefore dramatically affect the performance of Part 15 devices in the entire 2400 MHz band.

Most licensed uses operating in the 2402-2417 MHz band would have to be high-powered in order to co-exist with ISM devices in the band.^{21/} They would thus be more likely to both interfere with and receive interference from Part 15 devices.^{22/} Accordingly, "Part 15 users would not be capable of resolving interference problems [C]oexistence of new commercial services with Part 15 devices is unlikely and the good work

^{19/} Comments of Xircom at 2; see also Comments of IEEE 802 at 3; Comments of Andrew at 4,6; Comments of Microsoft at 4; Comments of Cylink at 4.

^{20/} See Comments of IBM at 7; Comments of EIA/CEG at 2; Comments of WINForum at 5, n. 12; Comments of Tetherless Access at 3; Comments of AMD at 5, n. 8; Comments of 3Com at 2; Comments of Rockwell at 2.

^{21/} See, e.g., Comments of Tetherless Access at 3; Comments of Larus at 1.

^{22/} See, e.g., Comments of IEEE 802 at 3; Comments of Symbol at 8-9; Comments of Part 15 Coalition at 5-6; Comments of Northern Amateur Relay Council of California ("NARCC") at 7; Comments of Western Multiplex at 3; Comments of Larus at 1.

already done to encourage development of spread spectrum technology would be slowed."^{23/} The comments confirm the Commission's predictions that "it is unlikely that a licensed service would be able to share this band with these [Part 15] devices,"^{24/} and that "installing a licensed service in this band may result in a loss to the public of Part 15 spread spectrum communications equipment."^{25/}

The costs of jeopardizing Part 15 use of the 2402-2417 MHz band would be enormous. Most alarming would be the effect on users who may be left with products that are rendered less effective or entirely useless as a result of reallocation. These users include not only individuals but businesses and institutions such as hospitals and universities, many of which have made significant investments in purchasing Part 15 devices.^{26/} Manufacturers would also be burdened with the costs of redesigning their technology, although it is not clear where these products could relocate, in any event.^{27/}

Thus, as the comments demonstrate, precluding use of these frequencies would have a dire economic impact on customers,

^{23/} Comments of NARCC at 7.

^{24/} FCC Report, ¶ 39.

^{25/} Id., ¶ 50.

^{26/} See, e.g., Comments of Windata at 2-3.

^{27/} As the Comments demonstrate, the 902-928 MHz band has become inhospitable for Part 15 use, and the 5.2 GHz band is not commercially available. See Comments of Apple at 8, n. 15; Comments of Part 15 Coalition at 3, 6-7; Comments of Microsoft at 3; Comments of IBM at 11.

the domestic economy, and U.S. export capability. AMD asserts that reallocation "would create millions of dollars in stranded investment and leave consumers with no reasonable substitute."^{28/} Moreover, as Andrew Corporation comments, because firms may well be unable to adapt their devices to the new environment in this band, reallocation will result in a loss of jobs and will damage the economy.^{29/} Moreover, the U.S. export market will suffer: currently, domestic wireless LAN equipment can be configured for export abroad, because the 2400 MHz band is used globally for data transmission. As numerous commenters recognize, loss of the 2402-2417 MHz spectrum in the United States would essentially eliminate this significant export market.^{30/}

These consequences are hardly theoretical. The mere release of the NPRM has already had a negative impact on Part 15 manufacturers. As Cylink experienced, "[w]ithin several days after the release of the NPRM, users questioned the depth of the Commission's commitment [to] Part 15 unlicensed products and services. Purchasing decisions have been 'frozen' or abandoned because potential customers believe that suppliers of Part 15 technologies do not have reliable access to the spectrum."^{31/} Injecting uncertainty into the new and still-developing market

^{28/} Comments of AMD at 5.

^{29/} Comments of Andrew at 9.

^{30/} See Comments of EIA/CEG at 5-6; Comments of Tetherless Access at 2; Comments of Motorola at 12-13; Comments of IBM at 11.

^{31/} Comments of Cylink at 5.

for Part 15 wireless technology is particularly devastating because it interferes with the possibility for growth: As Cincinnati Microwave observes, the proposals to redirect spectrum use away from Part 15 technologies have created "a hostile and suppressed atmosphere . . . and further je[o]pardizes investments already made in product development."^{32/}

If the Commission fails to stay the wise course it selected in 1985 to encourage Part 15 innovation, commenters predict that the effects are likely to be irreversible. As Andrew Corporation asserts, "Users will be extremely reluctant to invest in low power equipment that, based on repeated adverse reallocations in the past, will be rendered useless or materially impaired shortly after purchase."^{33/} Furthermore, the Commission's credibility among manufacturers and consumers as well as its ability to nurture new development of frequency bands will be seriously undermined. AMD believes that, "[f]aced with [reallocation] only four years after the FCC declared a desire to promote investment in 2.4 GHz Part 15 devices, manufacturers and consumers naturally will discount similar Commission pronouncements in the future."^{34/}

^{32/} Comments of Cincinnati Microwave at 1.

^{33/} Comments of Andrew Corporation at 8.

^{34/} Comments of AMD at 5.

II. NO VIABLE ALTERNATIVE HAS BEEN PROPOSED
FOR USE OF THE 2402-2417 MHZ BAND.

The Commission has recognized that its allocation decision should "ensure that the spectrum is put to its best and most valued use and that the greatest benefit to the public is attained."^{35/} The handful of uses for the 2402-2417 MHz band proposed by other comments do not satisfy this test. First, certain of the proposed services would provide extremely limited benefits to only a small fraction of the population: Pegasus Communications, for example, suggests utilizing the band for a mobile video service to be used in the horse racing industry.^{36/} Second, there has been no evidence showing that any of the proposed services can actually coexist with the band's present ISM, Part 15, and other uses. Indeed, the majority of comments agree that the band's ambient noise level and interference from existing devices make it "incompatible with high quality, reliable, wide-area wireless services."^{37/}

As described above, the comments make clear that adding licensed services of any type to the 2402-2417 MHz band will be

^{35/} NPRM, ¶ 8.

^{36/} Comments of Pegasus.

^{37/} Comments of AMD at 5. See also Comments of EIA/CEG at 5; Comments of Norand at 9; Comments of Microsoft at 4-5; Comments of NARCC at 9; Comments of Southern California Repeater and Remote Base Association at 2-3; Comments of UTC at 13-16.

detrimental to Part 15 use of the spectrum.^{38/} In addition, the relatively few services proposed for the band would have the potential to interfere with ISM devices. As the Commission has not proposed to eliminate ISM use, such service proposals are particularly flawed. A number of ISM users have expressed significant apprehensions about the effects of adding licensed services to the 2402-2417 MHz band. "The future of economic growth for ISM should not be endangered by assigning part of the 2400-2500 MHz band to extensive commercial communication uses."^{39/} Similarly, the comments of astronomy research users argue that licensed uses in the 2402-2417 MHz band "may cause detrimental interference . . . to planetary radar studies in the 2370-2390 MHz band."^{40/}

It is therefore not surprising that out of the approximately 90 comments filed in response to the NPRM, only six propose a service for the 2402-2417 MHz band. And these few comments fail to confront meaningfully or at all these

^{38/} Because any licensed use will congest the band considerably and reduce the quality of all communications using the spectrum, IBM does not believe that reallocation would be workable even if Part 15 use were deemed co-primary with these licensed uses or if the licensed uses were subject to technical rules designed to ensure maximum compatibility. Cf. Comments of Symbol at 8-9; Comments of Western Multiplex at 3; Comments of Motorola at 14.

^{39/} Comments of International Microwave Power Institute at 2. See also Comments of FusionLighting at 2; Comments of Fusion at 1.

^{40/} Comments of Cornell University at 2. See also Comments of National Research Council for the National Academy of Sciences at 5.

significant interference issues. Neither Leaco's proposal for a rural interactive video service nor the Wireless Cable Association International's ("WCAI") proposal even mentions interference issues.^{41/} Given American Telecasting's observation that the 2402-2417 MHz band is incompatible with wireless cable because of ISM interference,^{42/} the absence of any discussion of this problem is significant. Similarly, the Los Angeles County Sheriff's Department fails to address coexistence of its proposed public safety communications service with Part 15 use of the band.^{43/} If its proposal were accepted, Part 15 devices might not be able to operate in the Los Angeles area. As has been noted, "[t]his would preclude geographic portability, which is a key benefit of Part 15 devices."^{44/}

Loral/Qualcomm's proposal for a space-to-earth mobile satellite downlink also does not adequately address ISM concerns,^{45/} fails to consider Part 15 use, and completely contradicts its own earlier conclusion that the band is inappropriate for mobile satellite service ("MSS") due to interference concerns.^{46/} As many comments note, there is simply

^{41/} Comments of Leaco; Comments of WCAI.

^{42/} Comments of American Telecasting at 4-5.

^{43/} Comments of Los Angeles County Sheriff's Department at 5.

^{44/} Comments of WINForum at 5.

^{45/} See Comments of Fusion at 4.

^{46/} Reply Comments of Loral/Qualcomm at 3.

an absence of information about MSS coexistence with Part 15 and ISM use, without which the Commission cannot make a reasoned determination;^{47/} in fact, the sensitive directional antennas used by MSS downlinks suggest that coexistence will not be possible.

Tadiran's wireless local loop proposal implicitly recognizes the impossibility of coexistence, apparently requiring eventual elimination of all incumbent use of the spectrum in order for its proposed service to fully operate. Yet this proposal is not workable. Tadiran's suggestion that "the number of systems currently operating in this band is still relatively small,"^{48/} is belied by the extensive record in this proceeding. As the American Petroleum Institute ("API") observes, "A large volume and mix of Part 15 devices operate in the band. . . . Removal of spread spectrum operations from the band would be costly and difficult to implement."^{49/} Removing the millions of microwave ovens from the band would be even more unworkable.

Notably, most of the parties that had proposed uses for the 2402-2417 MHz band during earlier rounds of this proceeding have abandoned these proposals in light of the band's

^{47/} See, e.g., Comments of 3Com at 4; Comments of Cincinnati Microwave at 2; Comments of Compaq at 12.

^{48/} Comments of Tadiran at 3. Other local loop proponents had concluded that the band is incompatible for this service because of interference concerns. See, e.g., Comments of SR Telecom at 3; Comments of Bell Atlantic at 4-5.

^{49/} Comments of API at 7-8.

interference concerns.^{50/} In fact, at least two of these parties have changed course entirely and now argue that the band is entirely incompatible with a licensed service.^{51/} Considering the inability of any commercial service provider to describe a service that could actually be compatible with ISM and Part 15 use of the spectrum, the record demonstrates convincingly that the Commission was correct in its initial assessment that "[r]eallocation of the 2402-2417 MHz band presents little or no additional benefit to the public."^{52/}

III. ALLOCATING THE SPECTRUM TO ITS INCUMBENT USES
IS THE ONLY APPROPRIATE EXERCISE OF COMMISSION
ALLOCATION AUTHORITY.

Given the significant societal benefits of Part 15 devices, the enormous downside of interfering with Part 15 use, and the improbable and meager value to be gained by allocating the spectrum to licensed use, the commenters agree with IBM that the public interest requires allocation of this band to its incumbent uses.^{53/} Such an allocation would be consistent with

^{50/} See, e.g., Comments of APCO at 6; Comments of FCCA at 2; Comments of COPE at 5; Reply Comments of API at 7 (all filed in June, 1994).

^{51/} See, e.g., Comments of UTC at 15-16; Comments of API at 7-8.

^{52/} FCC Report, ¶ 50.

^{53/} See Comments of Metricom at 13; Comments of EIA/CEG at 6; Comments of WinForum at 9; Comments of Norand at 11; Comments of Motorola at 14; Comments of Windata at 3.

NTIA's recommendation that "the Commission should consider designating spectrum for some nonlicensed uses."^{54/}

Numerous comments point out that the Commission's own findings have stressed the significant contributions of Part 15 devices in this band and the limited value to be gained from allocation to licensed services. Indeed, they question why the Commission has now suggested an about face.^{55/} A significant number of comments find the Commission's reversal of position difficult to comprehend, because current Part 15 use of the 2402-2417 MHz band results directly from Commission encouragement of investment in spread spectrum technology,^{56/} and "Part 15 users have had . . . a reasonable expectation that the[ir] products . . . would be marketable."^{57/} In fact, Metricom questions whether reallocation of the band in light of the Commission's earlier findings and encouragement of the Part 15 industry would raise serious questions,^{58/} such as the lawfulness of the decision under the Administrative Procedure Act ("APA").^{59/} Under the APA, "an agency changing its course must supply a reasoned analysis indicating that prior policies and standards

^{54/} NTIA Letter.

^{55/} See, e.g., Comments of Part 15 Coalition at 4-5; Comments of EIA/CEG at 6; Comments of Norand at 10.

^{56/} See, e.g., Comments of Part 15 Coalition at 2, 5.

^{57/} Comments of American Radio Relay League at 27.

^{58/} See Comments of Metricom at 4-10.

^{59/} 5 U.S.C. § 706.

are being deliberately changed, not casually ignored, and if an agency glosses over or swerves from prior precedents without discussion, it may cross the line from the tolerably terse to the intolerably mute."^{60/}

Moreover, the Commission's proposal to utilize an "allocation [approach] that relies substantially on market forces" is particularly troubling, because it appears to be based on the premise "that most of the services to be provided in this spectrum would likely meet the statutory criteria for auctions."^{61/} Congress prohibited the Commission from considering auction revenues in making the public interest determination that must ground its allocation decisions.^{62/} The Commission itself acknowledged that it may use auctions only to award licenses, not to allocate spectrum.^{63/} As many of the comments stress, "the Commission must assess the public interest of particular spectrum allocations without being enticed by the prospect of auction revenues."^{64/} Thus, to the extent that licensed uses are preferred to unlicensed uses because the latter

^{60/} Greater Boston Television Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir), cert. denied, 403 U.S. 923 (1971); see also WLOS TV Inc. v. FCC, 932 F.2d 993, 995 (D.C. Cir 1991); Office of Communication of the Church of Christ v. FCC, 560 F.2d 529, 532 (2d Cir. 1977).

^{61/} NPRM, ¶ 9.

^{62/} 47 U.S.C. § 309 (j)(7(A)).

^{63/} NPRM, ¶ 9, n. 24.

^{64/} Comments of WINForum at 7. See also Comments of Metricom at 12; Comments of Norand at 11-12.

may not be subject to auctions, reallocation would violate the express mandate of the Budget Act.

As NTIA's recent letter suggests, the Commission currently has the opportunity to realize its goal of benefiting the public by preserving and enhancing important new technologies such as IBM's wireless LAN.^{65/} As the comments demonstrate, allocating the 2402-2417 MHz band to these incumbent uses "will create new jobs, foster economic growth, and improve access to communications by industry and the American public."^{66/} In addition, such an allocation will provide the kind of regulatory stability that is necessary to foster the growth of these emerging technologies.

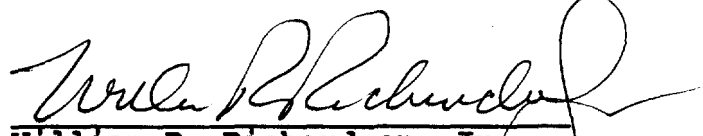
^{65/} NTIA Letter.

^{66/} Id.

CONCLUSION

For the foregoing reasons and those set forth in its Comments, IBM respectfully requests that the Commission allocate the 2402-2417 MHz band to incumbent uses, and decline to allocate it to any other licensed use.

Respectfully submitted,


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January 6, 1995

CERTIFICATE OF SERVICE

I, Lynn R. Charytan, hereby certify that I have this 6th day of January, 1995, caused to be delivered by first-class mail (except as noted) the foregoing Reply Comments of International Business Machines Corporation to the persons named on the attached service list.


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